Virtual Flybar System

Manual

Mikado Model Helicopters

Version 3-Achser 3.6.16 USB

This manual must be read in its entirety before installing and operating the V-Bar System!

This version of the V-Bar (3 axes) can be used in electric helicopters as well as in nitro helicopters.

CONTENTS

Questions / Help

VBar is an innovative technology developed and produced in Germany. Its applications are diverse. When installing or operating V-Bar, you may have questions which are not answered by this manual. Purchase of this VBar System entitles you to technical support by the manufacturer. If you have any questions or comments, please contact:

phone: +49 (0)331-237490
email: info@mikado-heli.de

or go to the V-Bar Forum on the following website: www.vstabi.de (Questions can be asked in English.)

1. What does the VBar do?

VBar stands for „**V**irtual Fly**bar**." (In German it is called "VStabi", from Virtual Stablizer Bar). The VBar simulates the behavior of the flybar and all its associated mechanical parts, so that these parts can be entirely be dispensed with.

The VBar is **not** an autopilot! An autopilot can steer or hold the heli in a given position. This is **not** what the VBar does. Rather, the VBar simulates the expected behavior of a conventional rotorhead (which includes a flybar). With the VBar, control of the helicopter's movements remains fully with the pilot. Errors in controlling the helicopter will inevitably lead to crashes. There are several advantages of the VBar, compared to a conventional rotor head. We will mention just a few of the important ones here. Firstly, as the digitally controlled rotor head has fewer mechanical components, weight and air drag are reduced. Secondly, by changing the settings in the VBar System, it is much easier to adjust the heli's performance to the pilot's individual requirements. In a multi-blade helicopter, a mechanical flybar cannot be used at all, so that the digital rotor head can supply all the advantages of a flybar head.

2. How does the V-Bar work?

VBar is an electronic unit which is placed between the receiver and the servos. It reads and analyzes the receiver signals. In addition it registers the helicopter's yaw rates along all three axes (elevator, aileron, and rudder) by SMM (Silicon Micro Machine) sensors. All measurements are entered into a mathematical algorithm, which outputs the desired values to be transferred to the servos.

3. Which helicopters are suitable for the VBar System?

Generally speaking, the VBar System can be used in any model helicopter, with the one prerequisite that the use of the V-Bar must not lead to any restrictions concerning the safe operation of the model. Of course the VBar cannot be used in any helicopter carrying humans or animals, or in helicopters which could in any manner endanger persons, animals or things. **You must refer to the safety recommendations included in section 13 of this manual.**

4. Installation

The VBar System includes the following components:

- Central Unit
- Gyro Sensor
- Bluetooth Module (optional)
- Control Panel (optional)

Each component must be installed in the helicopter properly. For instance, the wires of the central unit must be placed correctly. The gyro sensor needs to be calibrated along the longitudinal axis and the pitch axis. On the pages to follow, we explain some important details on the placement of the individual components of the VBar.

- Central Unit

The central unit houses the microprocessor and the power/voltage supply for the V-Bar. The supply voltage is 3.5 to 9 V.

The essential criterion for positioning the central unit has to do with wiring. The receiver must be connected without pulling or bending the wires. At the same time, the central unit must connect to the swashplate servos. The tail servo must also be connected.

The central unit must be protected from stronger vibrations (e.g. in a 90-size nitro helicopter). Do not tense or bend any wires. Always secure the unit, so that it cannot fall off. Ensure that it is never touched by any moving part of the helicopter.

- Gyro Sensor

The gyro sensor houses three individual sensor elements - one for elevator, one for aileron, and one for the rudder. The first two of these sit in perpendicular fashion with respect to each other. This is why the gyro sensor must be aligned perfectly along all three axes. The sensors are equipped with excellent interference rejection properties regarding any axis which is not the one they are meant to work for. As a result it is irrelevant where the gyro sensor is placed in relation to the rudder axis. However, it is very important that the sensor is installed so that the wires lead in longitudinal direction, facing forward or backward.

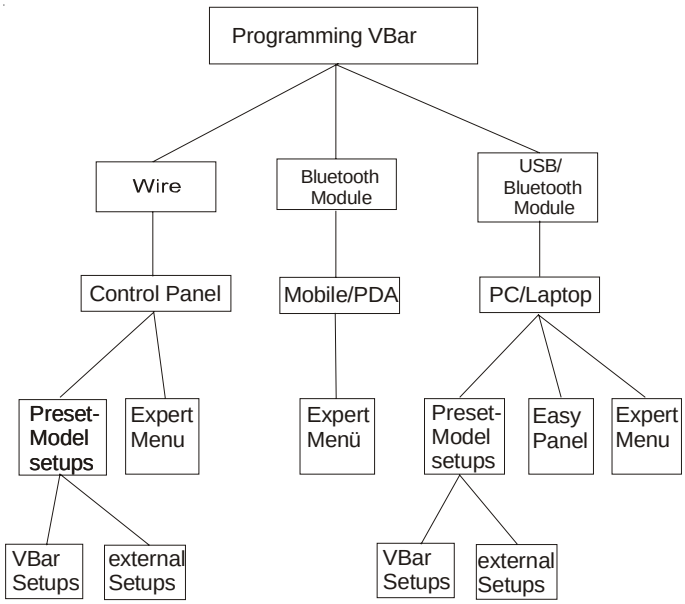
In addition, you should try to find a place for the gyro sensor where it is exposed to as little vibration as possible. Although the sensor itself is resistant to vibrations, the measured values can be blurred by vibrations. This is turn *leads to a higher propensity of the helicopter to oscillate. The most common reaction to high vibrations of the sensor elements is by offset. You will notice this when the trimming of different cyclic rates varies too much.*

As long the trimming varies only slightly, this is tolerable. However, if the trimming is greatly off balance, the level of vibration is too high. In this case the source of the vibrations must be eliminated. Otherwise you cannot use the VBar in this helicopter.

For mounting the gyro sensor it is recommended that you use the piece of adhesive foam included with the VBar kit.

5. How to program your VBar

Before you can use the VBar in your helicopter it needs to be programmed. There are several means for carrying out the programming:



Every VBar unit comes with a USB cable and software which allows for programming it via a PC or Laptop. You can also use a mobile phone, blue-tooth module (Mikado item no. 4056) or the special VBar control panel (Mikado item no. 4145).You can switch among these options at any time, so you can program your VBar at home, at the flying field or anywhere you choose.

Three different software types are available.

a) Using pre-installed model-specificsettings

Ready-to-use pre-installed set-ups are included for the most popular model helicopters, such as the different LOGO and TRex models. Just a few steps are necessary to program the VBar if you use one of these pre-installed set-ups.

Alternatively you may use setups which were created by other pilots if they were created for the model you intend to be using.

b) easy Setup

If you cannot find a read-to-use set up for your type of helicopter, you should use the Easy Setup option. When installing the software you will be asked if you wish to include the Easy Setup option on your desktop. If you say „yes“ a special icon will appear on your desktop.

To start the Easy Setup click on the icon. A dialogue will be initalized and you will be lead through the set-up in 21 steps.

c) Expert Software

Very experienced pilots who have been using the VBar for some time and are familiar with the individual parameters may choose to make adjustments via the Expert Software.

6. Where can I get addtional information on the VBar?

a) VBar Wiki

The VBar Wiki is an information data base in which you will find most everything that might be of interest about the VBar. You will find the Wiki on www.vstabi.de. The Wiki is available in English and German.

b) VStabi Forum

If the Wiki does not answer your question, you may get in touch with some expert pilots in the online forum on www.vstabi.de. They will help you along as best they can. Please use the Wiki as a resource first. It contains the answers to the majority of frequent questions. Reading the Wiki will also help avoid potential mistakes.

7. Installation of the PC-Software and of the USB driver

The CD contains the PC software and the software for the driver for the USB connection.

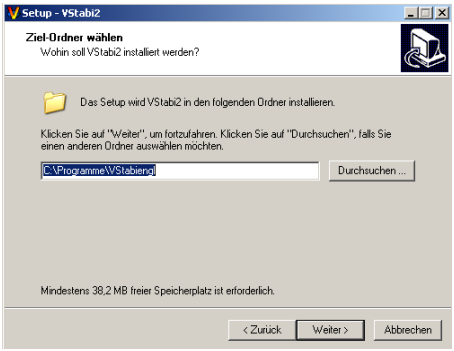
The software runs with most Window versions. The minimum requirements are:

- RAM: 256 MB minimum
- CPU: 100 MHz minimum
- Screen: at least 1024x768 px
- Interface: USB 1.1 and up
- Other: one CD ROM drive

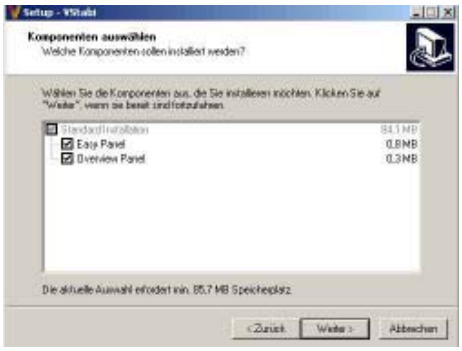
All set-up and adjustment operations must be carried out with extreme care and without rushing. Whereever you are, always make sure that you take your time and are aware exactly of what you are doing. Obviously, a misplaced click or entry can lead to a configuration of the heli which is not suitable for flying. This is why each step must be carried out carefully and subsequently checked.

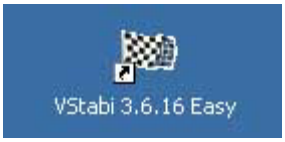
How to install the set-up software

The following series of images leads you through the installation software step by step.

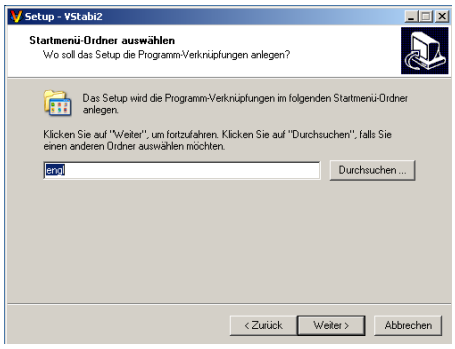


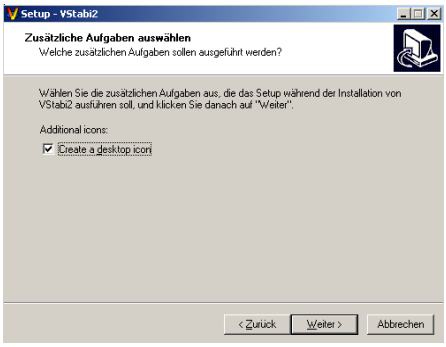
Please confirm here the folder to which software will be installed.



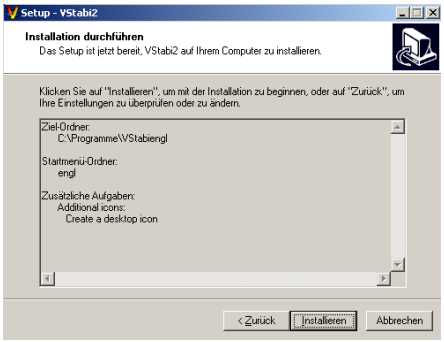


At this point you may choose to install the Easy Setup and the Overview Panel software. The Overview Panel shows you all paramaters thta can be adjusted.



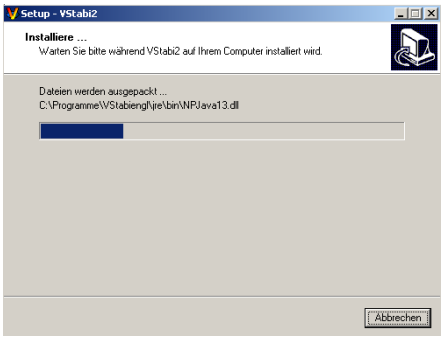


A new folder is created.

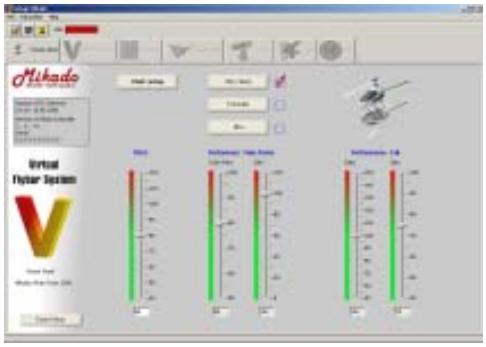


The copying process takes a few seconds.

The options chosen are displayed. Click on „Install“ to begin installation:



On successful installation, your desktop will show an icon for the VBar. By clicking on this icon you can start the software. You can also start the software using the Windows Start menu.

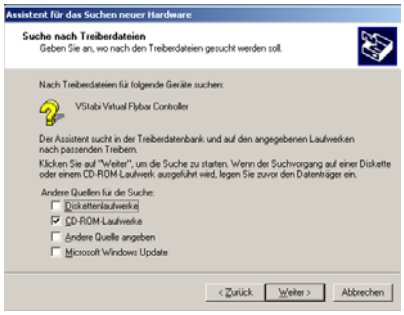


After starting the program, the first screen shows the starting page for the pre-installed model set-ups. To connect your PC/Laptop with the VBar you need to install the drivers first.

Installation of the USB driver

Place the CD into the CD drive. Connect the mainboard and the computer via the USB cable. Now turn on the VBar. Your Windows program will recognize the new hardware and open a new window

Now chose the box "Install software automatically“. Now Windows will load the new driver from the CD.



On starting the VBar software, the red "no connection“ message will switch to a green "connected“.

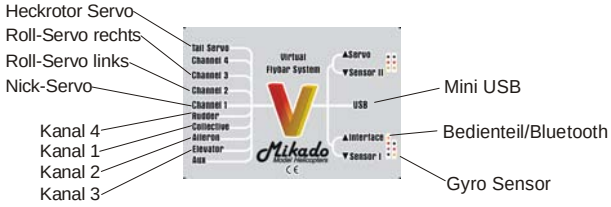
The VBar icon on your desktop

The VBar is now connected and all VBar parameters are read out, so that they can be displayed on the screen. Whenever you make a change on one of the control bars, it will be transmitted to the central unit and stored automatically. The modification will become effective immediately. This is why it is advisable to save the current set of parameters to your hard drive. This is done under "File ---> Save“. You can always restore a saved set of parameters.

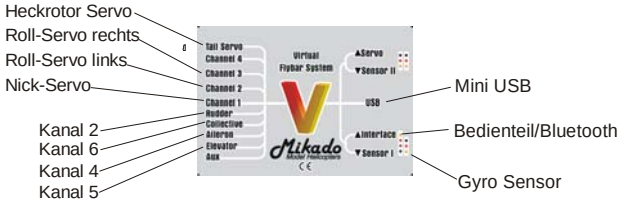
On the left you will find the serial number of your V-Bar and the date it was manufactured. If you wish to update the software at a later point in time, you will need this serial number.

8. Connection Diagram: Receiver - VBar - Servos

JR - Empfänger(Graupner)



FUTABA T14/T12 - Empfänger



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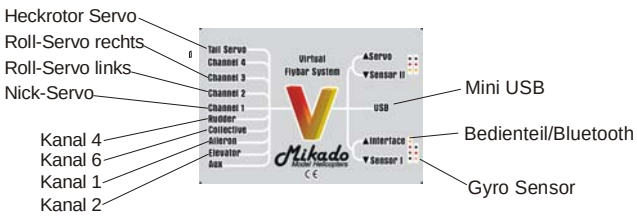


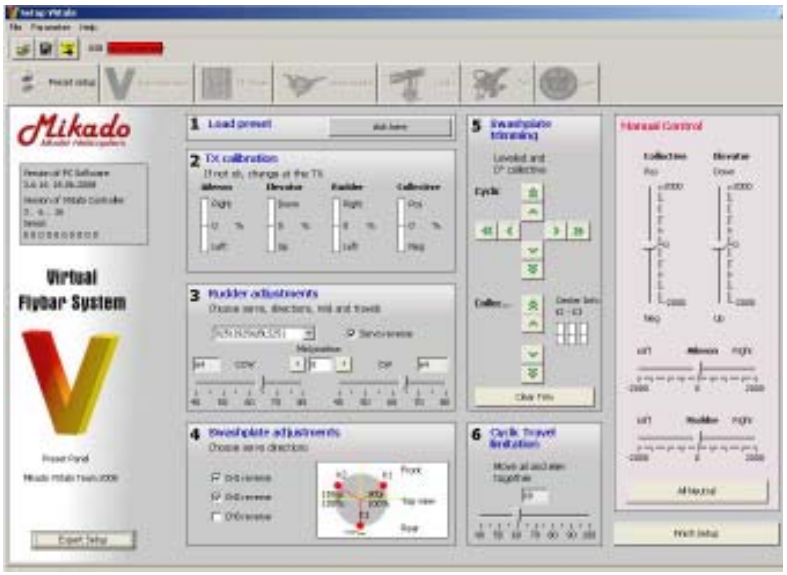
9. Programming when using pre-installed set-ups

In this section we guide you to a ready-to-fly set-up in just seven steps.

Prerequisites: You may begin with this procedure only after you have sucessfully installed and started the PC software on your computer. Subsequently you must connect the VBar with the receiver and the servos.

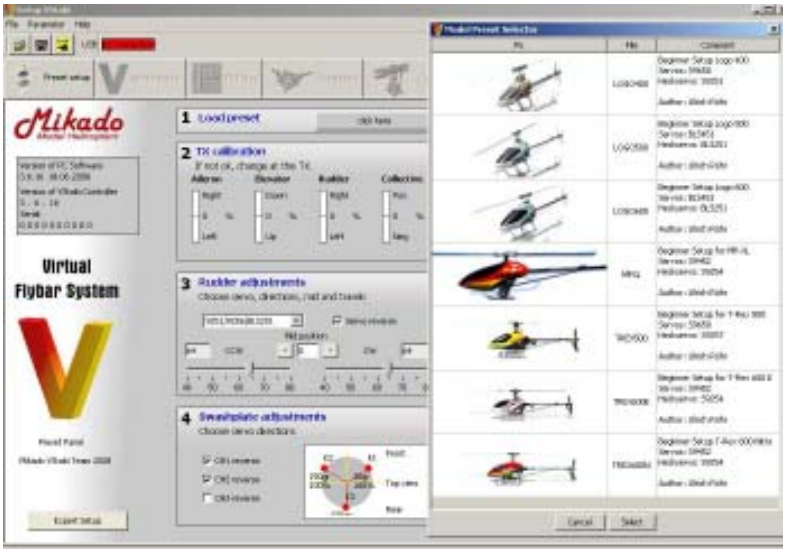
Step 1

Click on "Start Setup“ in order to switch to the set-up menu



Step 2

In the menu please follow steps 1 to 6 and complete the process by clicking on "Finish Setup“. During the set-up procedure you have access to a test mode. You can simply test the individual control functions in the box „Manual Control“.



1) Press "load preset“. Choose your helicopter model. All relevant model-specifc parameters and set-up data will be loaded into the VBar.

2) TX calibration (very important!). This step is necessary to check the effective direction of the radio. If necessary you need to switch the effective direction of your radio. Only after you have checked that all control channels of your radio are effective in correct direction you can procede with the next step here. Note that your radio must be free of any pre-programming. It is used as a simple 4-channel radio.

3) This step choses the tail servo you are using. Please adjust effective direction, servo center and servo travel.

4) Check the effective direction for cyclic, elevator and aileron here. Invert if necessary.

5) Swashplate Trimming: This step is to trim the swashplate. Note that at 0° pitch the stick is centered and the servo arms are in neutral.

6) Cyclic Travel Limitation: This lets you control the maximal cyclic travel. Ensure that the cyclic travel is set so that the swashplate never touches the main shaft.

Step 3
By clicking on *"Finish Setup"* you return to the page showing the setup parameters. At the same time the Manual Control mode is deactivated.

Using the control bar for the main and tail rotor you can adjust the flight properties of the helicopter.

In addition you may activate the expo-function for cyclic, elevator and aileron in your radio and adjust the flight characteristics of your helicopter to your taste.

There are three different options to adjust the flight characteristics of your helicopter:

VBar Classic

If you choose the VBar Classic mode, the helicopter will perform like a conventional helicopter with a flybar and paddles. In fast-forward flight the helicopter will pitch up slightly.

Extended

In the Extended mode the elevator function includes an addition Heading Hold component which operates in relation with pitch. It will ensure the helicopter will move forward perfectly in fast forward flight. This setting may take some getting used to for some pilots, especially at stick center.

Ultra

The Ultra mode combines very good hovering characteristics with perfect forward flight. This mode is preferred by advanced 3D pilots due to its highly dynamic characteristics. This mode requires that very fast and powerful swashplate servos are used.

Important note: The first flights for set-up and trimming must be carried out in Classic mode. You must feel familar with the use of VBar in your your current helicopter to go to Extended and Ultra modes.

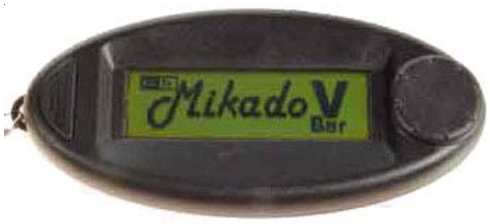
10. Expert Menu

To get to the Expert menu click on the button „Expert Setup“ on the left bottom of the panel.

The description for the set-up options of the Expert Setup Menu can be found in the VBar Wiki under www.vstabi.de - both in English and German.

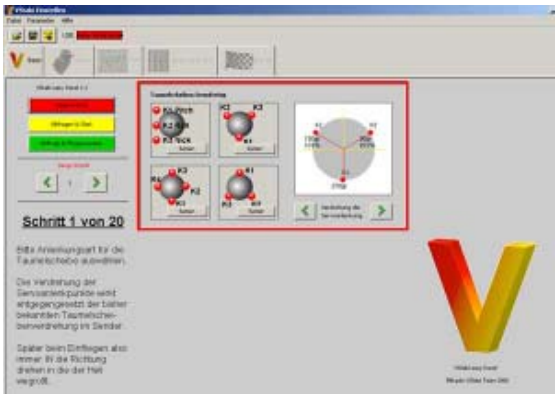
11. VBar Control Panel

The VBar Control Panel contains the set-up menu for the pre-installed setups as well as for the Expert software. The menus are structured very similar to how it is done in the PC software. An exact description of the menu structure is included with the control panel.



12. Easy Panel Software

By using the Easy Panel Software you can create a basic set up for your helicopter. You would do this if you are using a model for which no pre-installed set-up has been provided in the software or from another source. You are guided through a dialogue of 21 steps. After you have completed each step you will have a ready-to-fly VBar set-up. The software for the Easy Panel is installed together with the VBar software. There will be a separate icon for the Esay Panel on your desktop. A set-up which has been created by the Easy Panel is fully compatible with both the PC and the Control Panel software, so it can be further adjusted using either device.



The helicopter is now programmed for its first flight with the VBar System. Pull the patch cable and save the data to your laptop. **Before taking off, you must understand and comply with the following safety guidelines.**

13. Important Safety Guidelines

- Initializing

After connecting the VBar, it initializes. This can take a few seconds. The completion of the initialization is indicated by a twitch of the swashplate. The heli must not be moved during the intialization process. You must have seen this brief twitch of the swashplate before you start operating the helicotper in flight.

- General Guidelines

A radio-controlled model helicopter is not a toy. Absolutely every step in connection with building and operating the helicopter must be carried out with utmost care. It is essential that you are aware of the function of every step which you are performing. If there is the slightest unclarity about what you are doing, you must stop immediately, you must have that question completely resolved first. You must also stop building or operating the model, if you find that the manual is unclear to you.

Be aware that any improper handling can cause the helicopter to crash. Such crashes may lead to total loss of the helicopter and it can severely damage things or persons. Any model helicopter, and in particular a model helicopter with an installed VBar System, may not be operated in such a way that any things or persons are in danger of being damaged. The VBar System may be installed and operated only in helicopter systems, which are designed to be operated with a flybarless rotor head.

- Settings

The VBar is a system placed between the receiver and the controlling units of the helicopter. Thus the VBar is one of the actively controlling elements of the helicopter.

If any parameter is set incorrectly, it is possible that this setting can no longer be overridden via a radio signal. This may lead to an incontrollable crash of the helicopter.

Even when overriding is possible, it is usually the case that the pilot cannot react fast enough to make the appropriate correction. For this reason you must procede carefully when adjusting any settings.

Of all the parameters, the following are the most critical: polarity of the sensors, all swashplate parameters, the Hiller ratio of the control loop.

-Pre-flight check

Prior to each flight, you must double-check the active direction of the sensors and the setting of the swashplate parameters. You can do this without using the software, simply by lifting up the helicopter at its rotor head, after it has been turned on and initialized. To test effective direction, simply move the heli in your hand along all axes. The direction of swashplate movement always needs to be the opposite of the direction of motion. In multi-blade rotor heads there can be a timelag. In this case you may take the rotor blades as a point of reference.

To check the swashplate settings you need to give stick input to all functions prior to start. Check that cyclic and collective are responding in the right directions.

The Hiller ratio is checked by brief consecutive inputs to elevator and aileron. After each input the swashplate must move back approx. 30% of the way immediately. Subsequently the swashplate moves back slowly the rest of the way.

This pre-flight checking procedure takes only a few seconds and it makes apparent most of all possible severe setting errors. It is a procedure for ensuring that none of the settings have been lost. It is not a guarantee for correct settings.

- Additional parameters

If any additional parameters have been entered or parameter settings have been adjusted, it is necessary to apply special care. In this case you have to ensure with particular caution that the helicopter is operated in such a way that there is no chance that any items or persons are harmed. Always stay a few meters away from the helicopter to avoid any situation where you or any other person is in danger of getting hurt.

- Flying

The default settings in the V-Bar System are such that it the model with will behave much similar to a model with a flybar and paddles. If you do not modify the settings for elevator, aileron or rudder, you should not expect any surprises. We call this setting a "balanced system setting“.

Sometimes it may appear that on lift-off the heli "overreacts". This is due to the fact that the control functions are not working for als long as the heli is not up in the air.

14. Rotorhead Settings

If you do not want to use a Mikado rotor head in your helicopter, you need to check a few mechanical points in the rotor head, before using the VBar.

1) The blade holders must be installed such that the likages run exactly parallel to the center axis of the rotor shaft. (See picture below.) If the arms of the blade holders are not long enough, you can make them longer using distance bolts or washers. The distance between the center of the main rotor shaft and the ball at the bladeholder should be 30 mm.

2) The dampening in the rotor head has a great effect on the flight properties of a VBar rotor head. It is advisable that the rotor head dampening is adjustable, should this become necessary.

3) It is necessary to install a swashplate driver. Mikado offers a swashplate driver for 10 mm main rotor shafts. It has eight ball bearings:

item no. 4018

You will find more information on the mechanical prerequisites for using the VBar in the VBar Wiki on www.vstabi.de.

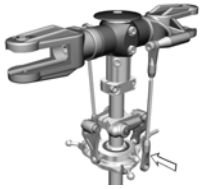
15. Additional Components

VBar rotorhead w. 14mm blade holders (LOGO 14/600), item no. 4042

VBar rotorhead upgrade for LOGO 14/20/24/600, item no. 4053

VBar rotorhead w. 12mm blade holders (LOGO 10/500) item no. 4041

V-Bar rotorhead upgrade for LOGO 10/500, item no. 4052



Control Panel for VBar, item no. 4152

Patch cable (servo cable VBar to receiver 80 mm), item no. 4055

Patch cable (servo cable VBar to receiver 100 mm), item no. 4141

Patch cable (servo cable VBar to receiver 150 mm), item no. 4142

Blue-tooth module, item no. 4056

Control Panel for VBar, item no. 4152

Gyro sensor, item no. 4157

Main Unit, item no. 4158

16. Technical Data

Supply Voltage.....3,5-9 V (1)

Current Consumption.....max. 150mA

Operating temperature .....-15° to 60° Celsius

Processors..... 2*DSP 32/60 Mhz

(1) Absulute Grenzwerte, bei Überschreitung kann Schaden entstehen.

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